

Chapter Two

Environmental Resources

Overview

Carroll County and the incorporated municipalities worked in a collaborative effort through an Interjurisdictional Steering Committee and adopted an Environmental Resources Element “ERE” of the Comprehensive Plan. This element satisfies the State requirement to develop and adopt a “sensitive areas” element to the Plan. In that regard, City staff worked collaboratively with County staff in 1998 to incorporate elements of the ERE into the City of Westminster Comprehensive Plan.

The following is an update to the original Environmental Resource Element of the City of Westminster Comprehensive Plan adopted on June 28, 1998. This update includes actions taken by the City to further enhance the protection of natural resources, as well as update the goals and objectives as discussed by City and County staff.

Planning Act

On October 1, 1992, the Maryland Economic Growth, Resource Protection, and Planning Act of 1992 took effect. The Planning Act, as it is called, amended Article 66B of the Annotated Code of Maryland, which is the enabling legislation for planning and zoning in Maryland’s municipalities. The Act is designed to encourage economic growth, limit development sprawl, and protect the State's natural resources.

The 1992 Planning Act was adopted because of a recognition within the State that changes in land use within the State have resulted in a decline in the quality of the State's environmental resources and, therefore, a related decline in the quality of life for the citizens of the State. As development has expanded throughout the State, the impacts on our local environmental resources have increased. Studies have demonstrated that the cumulative effect of these changes on a local level have caused a decline in the Chesapeake Bay, as well as other environmental resources.

This Environmental Resources Plan is focused on reducing any additional adverse impacts on the environment as the County and municipal land use plans are implemented. There are several other programs, either ongoing or under development, which function to reduce problems created by current land use practices. These programs include the Natural Resources Conservation Service (NRCS), Soil Conservation District (SCD), and Extension Services working with farmers to institute Best Management Practices (BMP) to reduce pollution; design the local water resources programs to protect local public water supplies; and the State's Tributary Strategies. An educational program is also underway to help the average individual homeowner realize that the fertilizers and pesticides used on yards, waste disposal methods, and the overuse of personal vehicles impact environmental resources. The Act does not require that environmental resources be addressed in relation to land used for agricultural purposes.

New responsibilities have also been imposed by the State through amendments to Title 5 of the State Finance and Procurement Article. In order for local jurisdictions to remain eligible to receive certain monies from the State, they must comply with the Planning Act.

A premise of the Act is that the local comprehensive planning process undertaken by counties and towns is the most effective and suitable method to establish priorities for growth and resource conservation, and that once those priorities are established at the local level, it is the State's responsibility to support and uphold them. County and municipal comprehensive plans are being amended to address an established set of policies, called "visions." The visions were prepared as part of the 1987 Chesapeake Bay Agreement between Maryland, Virginia, the District of Columbia, and Pennsylvania and are reiterated by the Maryland legislature in the 1992 Planning Act. These visions are as follows:

1. Development is concentrated in suitable areas;
2. Sensitive areas are protected;
3. In rural areas, growth is directed to existing population centers and resource areas shall be protected;
4. Stewardship of the Chesapeake Bay and the land is a universal ethic;
5. Conservation of resources, including a reduction in resource consumption, is practiced;
6. In order to achieve Visions 1 through 5, economic growth is encouraged and regulatory mechanisms are be streamlined;
7. Adequate public facilities and infrastructure under the control of the county or municipal corporation are available or planned in areas where growth is to occur; and
8. Funding mechanisms are addressed to achieve these Visions.

Article 66B, Section 3.06, requires that all local comprehensive plans address these visions. Furthermore, Section 3.05 of Article 66B requires that the plan include a sensitive areas element that contains goals, objectives, principles, policies, and standards designed to protect, from the adverse effects of development, sensitive areas, including streams and their buffers, 100-year floodplains, habitats of threatened and endangered species, and steep slopes. The sensitive areas element can also include other areas in need of special protection, as determined in the local plan. This chapter serves as the sensitive areas element of the *City of Westminster Comprehensive Plan* and fulfills these requirements of Article 66B.

Environmental Resources Element

This element of the comprehensive plan, which Carroll County and the incorporated municipalities within the County have titled the Environmental Resources Element, will describe how the jurisdictions will protect the following sensitive areas from adverse impacts of development: 1) streams and their buffers, 2) 100-year floodplains, 3) endangered species habitat, and 4) steep slopes. The Act does not specify the physical extent of any sensitive area or the degree of protection the jurisdiction must provide for it.

In addition to these four sensitive areas, which the Act requires a jurisdiction to protect, the jurisdiction may also choose to provide some level of protection to other environmental resources, which it feels are vital to its interest. Five additional environmental resources have been identified for Carroll County and the local municipalities, which will also be addressed in the Environmental Resources Element. These resources are: 1) wetlands, 2) wellhead buffers, 3) carbonate rock areas, 4) reservoir watersheds, and 5) Use III waters.

Climate

In general, the City of Westminster has a humid, continental climate with four well-defined seasons.

The mean temperature in Westminster is approximately 53 degrees Fahrenheit, with wide variations in temperature between different times of the year. The hottest part of the year is the last part of July and the beginning of August, and the coldest time of year is the latter part of January and the early part of February. A temperature of 90 degrees Fahrenheit or more can be expected on an average of 22 days per year. During winter, the temperature falls below 32 degrees Fahrenheit frequently.

The annual average precipitation in Westminster is approximately 42 inches. In general, precipitation is fairly evenly distributed throughout the year. There are normally 3 to 4 inches of precipitation per month for most of the year, with slightly higher recordings in July and August. Droughts are possible at any time of year; however, a serious drought is most likely during the summer.

The average annual snowfall in Westminster is 33.5 inches; however, the annual total snowfall varies greatly from year to year. There are typically 7 to 8.5 inches of snow per month between December and March, with the heaviest snowfall occurring toward the end of the winter in February and March.

The prevailing wind in the Westminster area is from the west-northwest or northwest, except from June through September, when the prevailing wind is southerly. The average wind velocity is 8 to 10 miles per hour, but winds of 50 to 60 miles per hour sometimes accompany hurricanes, severe thunderstorms during the summer, or general storms during the winter. Tornadoes have also been known to touch down in the Westminster area.

Topography

The topography in the Westminster area is rolling, with elevations that range from 540 feet above sea level at the Wastewater Treatment Plant to 900 feet above sea level at the southeast end of the City. Two irregular ridges cross the Westminster Community Planning Area (CPA) from north-northeast to south-southwest. A northeastern extension of Parrís Ridge connects Mount Airy with Westminster, and a northeastern extension of Dug Hill Ridge connects the northern areas of Westminster, around the Air Business Center, with Manchester.

Areas containing steep slopes predominate in three general locations within the Westminster CPA. In the southwest portion of the CPA, steep slopes occur in the area along Little Pipe Creek and the Western Maryland Railroad, and in the area southeast of Stone Chapel Road and Old New Windsor Pike. In the northeast portion of the CPA, steep slopes occur in areas along the West Branch and its tributaries and the Western Maryland Railroad.

Soils

There are two general soil types in the City of Westminster. A majority of the Westminster Community Planning Area is comprised of the Glenelg-Manor-Mt. Airy association. This type of soil is defined as well-drained and somewhat excessively drained, mainly hilly soils that are deep and moderately deep over schist. Since many areas are too steep for regular cultivation, proportionately more of the land within the City is wooded than land in the unincorporated portion of Carroll County. The Mount Airy soils are only 2 to 3 feet deep to bedrock, and therefore, have severe limitations that restrict the use of septic systems. The Glenelg and Manor soils have less severe limitations on the use of septic systems.

Two areas of the Westminster CPA are located in the Mt. Airy-Glenelg association. A small finger of this association extends to the northwest part of the CPA in an area west of Maryland Route 97 in the vicinity of the Air Business Center. Another area is located in the southwest portion of the CPA. Situated generally south of Main Street and Uniontown Road, it extends from east of Maryland Route 27 (midway between Maryland 27 and Maryland 32) westerly to beyond the CPA boundary. This association is dominantly somewhat excessively drained, rolling to very steep, and contains channery soils that are moderately deep and deep over schist. The soils of this association are more strongly sloping, and the slopes are more broken than the soils in other parts of Carroll County. Sizable areas are still woodland and those areas within floodplains should remain wooded. Some of the steeper cleared areas that are eroded are prime candidates for reforestation, either naturally or by planting. A cover of trees in floodplains or on steep slopes would protect the watershed and reduce damage by floodwater and transported soil material in other areas. The majority of soils in the Mt. Airy-Glenelg association are generally too shallow or too steep for the use of septic systems.

The *Soil Survey of Carroll County, Maryland* classifies soil types into eight categories. Class I, II, and III soils are considered to be prime agricultural soils, as well as prime development soils. Class IV soils are generally considered to be productive, but not prime. The Class V through VIII soils are also productive, but are not considered to be prime because of slopes in excess of 8 percent or other characteristics. Although there are no active agricultural

areas within the City of Westminster, this information is also useful for development, as mentioned above. Approximately 63 percent of the land area within the Westminster corporate limits contain Class I, II, or III soils, and another 22 percent of the soils are Class IV. Only 15 percent of Westminster is characterized by Class V through VIII soils, which may require special development techniques to minimize environmental impacts.

Surface Hydrology

The Westminster Community Planning Area is located on a watershed divide. The southeastern portion of the Westminster CPA drains into the Patapsco River basin, and the northwestern segment drains into the Middle Potomac River basin (which includes the Monocacy River) via Big and Little Pipe Creeks. Since Westminster is located on a watershed divide, the headwaters of most of the streams that flow through the CPA are located within the CPA. Additionally, due to the area's complex topography, numerous small sub-watersheds are located throughout the Westminster CPA.

The Westminster CPA contains a relative abundance of major streams and tributaries. The portion of the CPA to the southeast of Parr's Ridge and Dug Hill Ridge drains to the North Branch of the Patapsco River, which in turn drains to Liberty Reservoir located downstream of Westminster. Streams which traverse the CPA within this watershed include West Branch (also known as Hull Creek; traversing 4.5 miles within the CPA), Cranberry Branch (which drains to Cranberry Reservoir, a major component of the City of Westminster's community water supply system; 2.3 miles), Beaver Run (2.7 miles), Middle Run (0.8 mile), and Little Morgan Run (1.5 miles).

The area northwest of Parr's Ridge and Dug Hill Ridges includes two major watersheds which drain to the Monocacy River: Big Pipe Creek (northwest of Dug Hill Ridge) and Little Pipe Creek (northwest of Parr's Ridge). Little Pipe Creek (4.2 miles) and Copps Branch (2.7 miles) are the two major streams within the Little Pipe Creek drainage area which traverse the Westminster CPA. Meadow Branch of Big Pipe Creek (1.9 miles) is the sole major stream within the Big Pipe Creek watershed, which traverses the CPA.

The streams and tributaries of the Little Morgan Run, Beaver Run, and Middle Run, generally located in the southeast portion of the Westminster CPA, are classified as Use III-P streams (natural trout streams which also drain to public water supplies). These three streams comprise a portion of the North Branch of the Patapsco River drainage area, which flows to Liberty Reservoir. The other streams in the Westminster area are Class IV-P (recreational trout streams which also drain to public water supplies).

The numerous streams that traverse the Westminster CPA generally have steeply sloping banks. Consequently, the corresponding flood plain areas are relatively steep and narrow. Non-tidal wetlands are sparsely dispersed in the Middle Potomac River basin, but are more abundant in the Patapsco River basin.

Geology and Subsurface Hydrology

The Westminster Community Planning Area is underlain by a variety of rock types. Schist, phyllite, metavolcanic rocks, and carbonate rocks trend in north-northeast to south-southwest bands across the area. Ridges are primarily formed by relatively resistant areas of Marburg phyllite. Marburg schist underlies areas to the southeast of Westminster and forms hilly terrain with narrow, steep-sided valleys. Low rolling hills and some valley areas (Bachman Valley) are generally underlain by metavolcanic rocks (schist and basalt) of the Bachman Valley and Sam's Creek formations. Low-lying areas of the Westminster area are frequently underlain by lenses of Wakefield Marble carbonate rocks. These underlie the Wakefield Valley and occur in central portions of the Westminster area as very narrow and elongated bands. Carbonate rocks are often closely associated with the metavolcanic rocks of the area.

Phyllite, which underlies a significant portion of the Westminster area, is resistant to weathering and forms a relatively thin saprolite. Groundwater development potential is limited as a source for public water supply in this hydrogeologic unit. A large area covering the southeastern portion of the city is underlain by the schist saprolite-type aquifer. The weathered zone locally extends to depths of greater than 100 feet and has good groundwater development potential where sufficient permeability and saturated thickness exists. Metavolcanic rocks, which occur in bands through the Westminster area, will have locally weathered zone thicknesses of well over 100 feet and very good groundwater development potential. Carbonate rock lenses are found primarily in the areas to the west of the City. These occur as northeast-to-southwest trending bands and have excellent groundwater development potential. The lenses are bounded by less permeable rocks such as phyllite and schist, which limit both areal drawdown and groundwater availability. The lenses, or bands, of carbonate rock are susceptible to contamination. Sinkholes have been associated with groundwater withdrawals in the Wakefield Valley.

Community Water Supply

The City of Westminster owns and operates the community water system serving the municipality and a large amount of the Community Planning Area. The system relies on the Cranberry Reservoir and groundwater supplies to provide sufficient supply to it. Eleven wells currently provide groundwater to the water system, and several of these wells are located within the carbonate rock. The City continually searches for additional groundwater supplies, typically through the development of newly annexed lands. Carbonate rock formations are prolific in providing larger quantities of water than many other types of hydrogeologic formations, but they are also more susceptible to contamination.

Forested Areas

Forested areas are dispersed throughout the Westminster Community Planning Area and tend to concentrate along steep-sloped areas, including the steep slopes bordering stream valleys. Sizable forested areas are located on the southeast side of Maryland Route 31 and Avondale Road and along the West Branch stream valley, and function as connected wildlife corridors.

"Sensitive Areas" Definitions

The Planning Act of 1992 does not specify the extent or degree of protection to be accorded to each environmental resource. Therefore, the definitions developed for each environmental resource identify the level of protection. This chapter includes definitions both for the "sensitive areas" required to be protected under the Planning Act as well as the additional environmental resources identified as "sensitive" by the City.

The environmental resources, which are required to be protected under the Planning Act, are streams, stream buffers, steep slopes, 100-year floodplains, and habitats of threatened and endangered species. They are defined as follows:

1. "Stream" means part of a watercourse, either naturally or artificially created, that contains intermittent or perennial base flow of groundwater origin. Ditches that convey surface runoff exclusively from storm events are not included in this definition.
2. "Stream buffers" are areas that extend a minimum of 100 feet from the top of each stream bank along both sides of a stream unless modified by the Planning Commission.
3. "Steep slopes" are defined as areas with slopes greater than 25 percent.
4. The "100-year floodplain" is that land typically adjacent to a body of water with ground surface elevations that are inundated by the base flood, which is the 100-year frequency flood event as indicated in the Flood Insurance Study, as amended, the elevation of which is used for regulatory purposes.
5. "Habitats of threatened and endangered species" are areas which, due to their physical or biological features, provide important elements for the maintenance, expansion, and long-term survival of threatened and endangered species listed in COMAR 08.03.08. This area may include breeding, feeding, resting, migratory, or overwintering areas. Physical or biological features include, but are not limited to, structure and composition of the vegetation; faunal community; soils, water chemistry and quality; and geologic, hydrologic, and microclimatic factors.

Additional Environmental Resources

The County and municipalities have identified additional environmental resource areas that they feel are worthy of protection under the Environmental Resources Element as well. These resources include wetlands, wellhead buffers, carbonate rock areas, reservoir watersheds, and Use III waters.

1. "Wetlands" (defined under COMAR, Title 08.05.04.01) are generally areas that are inundated or saturated by surface water or groundwater at a frequency and duration sufficient to support, and that under normal circumstances does support, a prevalence of vegetation typically adapted for life in saturated soil conditions, commonly know as hydrophytic vegetation.
2. "Wellhead buffers" are areas which extend a minimum of 100 feet around any existing or proposed community water supply well or well site, unless modified by the Planning Commission, as may be designated on the adopted Water and Sewer Master Plan or the County Comprehensive Plan, or identified during the development process.
3. "Carbonate rock areas" are areas that are currently known or suspected to be underlain by carbonate rock. This includes the Wakefield Marble and Silver Run Limestone geologic units, as well as unnamed calcareous zones within schist and phyllite areas.
4. "Reservoir watersheds" are areas which drain into an existing or proposed water supply reservoir.
5. "Use III waters" (defined under COMAR, Title 26.08.02) are protected for the propagation of natural trout populations. These waters are governed by more stringent dissolved oxygen, chlorine, and temperature standards than other waters.

The Significance of Environmental Resources in Westminster and Carroll County

The sensitive areas required for study by the Planning Act of 1992, as well as the additional natural resources identified as sensitive by Westminster and Carroll County are described in detail below. A generalized map of the sensitive areas, produced by the Carroll County Department of Planning, is available for review at City Hall. Protection measures for these natural resources will be dealt with on a case-by-case basis through the development review process and in accordance with the goals, objectives, and recommended actions in the Plan Implementation chapter of this document.

Streams

Carroll County is located in the Piedmont region of north-central Maryland. Parr's Ridge, which runs through the City of Westminster, diagonally divides the County into two major drainage basins. Streams to the north and west drain into the Monocacy River and eventually the Potomac River. Streams to the south and east flow into the Patapsco and Gunpowder Rivers towards the Chesapeake Bay. These two major drainage basins contain many miles of streams in Carroll County. Their uses range from recreational uses, such as fishing and canoeing, to agricultural uses. Every stream in the County eventually feeds into the Chesapeake Bay and contributes to its water quality and ecological health. Overall surface water quality in Carroll County is generally good; however, incidence of fecal coliform bacteria from animals and human sources occur quite frequently. Large dairy and livestock farms have a high potential for contributing pollutants into surface waters if Best Management Practices are not followed; however, failing septic systems are the primary source of high fecal coliform levels in some areas of the county.

Healthy streams contain a diversity of characteristics, including slow-moving runs, deep pools, gravel riffles, bends, and vegetative cover. These features have a direct effect on the stream's response to rainfall and the level and consistency of flows. These features are also essential to the overall water quality of a stream. Stream water needs to contain sufficient dissolved oxygen and provide suitable temperatures in order to serve as a habitat for plants and animals. Stream acidity and alkalinity should be balanced, the water should be clear of sediment and pollutants, and dissolved minerals should be in natural proportions.

Changes in natural ground cover and the intensity of use of the land have the greatest effect on the quality of streams. Increase in the amount of impervious surfaces and a decrease in vegetation result in altered and inconsistent levels of flow. High flows may cause flooding, and subsequently, the banks along the streams to cave in. High flows may also cause stream beds to widen as mud and sand deposits fill the channel as the bank erodes away. Low flows may cause parts of stream beds to dry up for periods of time. Low flows also carry higher concentrations of pollutants.

Stream Buffers

Stream buffers are the areas on either side of a stream which create a corridor of natural vegetation along a stream's course and which contribute to stream water quality. Buffers often include areas of the floodplain, wetlands, and/or forest. These corridors are considered buffers because they help to buffer the streams from erosion and sedimentation and filter out pollutants. Many of Carroll County's streams are part of the watershed areas for existing and proposed reservoirs. Therefore, maintaining and/or improving the quality of this water is critical. The riparian vegetation and other features of natural buffers have been eliminated from many of the streams in Carroll County. Property owners often remove vegetation, add fill dirt, and plant and mow grass up to the stream's edge. Many streams that run through pastures have had their riparian vegetation damaged or destroyed by livestock.

Stream buffers protect the biologic and hydrologic integrity of the stream basin. They minimize runoff and groundwater pollution by filtering pollutants through the soil and root zone. Undisturbed buffers protect wetland and upland plants and provide a corridor for food and cover to a variety of animals. Wetlands and floodplains within a stream buffer slow storm flows and dissipate flood water energy, allowing more of the water to percolate into the ground. The result is decreased flood damage and replenished groundwater aquifers. Without naturally vegetated buffers, more runoff and pollutants reach the stream carrying greater levels of sediment. Riparian vegetation increases soil stability and provides shade that cools stream waters. Interception of rainfall by trees and shrubs helps to maintain more consistent stream flows by reducing the amount of stormwater runoff before it begins.

Wooded areas in stream buffers are ideal for many reasons. They protect watersheds from the siltation and erosion resulting from heavy runoff or wind. The forest floor filters water percolating into groundwater reservoirs, while leaves on the trees also absorb air pollutants. Trees and shrubs prevent some of the adverse impacts to sensitive areas caused by rainfall by intercepting some of the rainfall before it reaches the ground. Evapotranspiration allows some of this intercepted water to evaporate while the trees utilize some of the water during photosynthesis. These woodlands also serve to provide visual and noise buffers between various land uses. Woodlands also provide excellent habitat for wildlife. For these reasons, natural vegetation within stream buffers should not be disturbed unless necessary, such as allowing disturbances for utilities and road crossings, and where appropriate, allowing the development of stormwater management facilities, particularly outfalls and water quality ponds.

100-Year Floodplains

Land designated within a 100-Year Floodplain carries a 1% chance in any one year that flood levels could reach or exceed the base flood elevation. Floods of this magnitude could be experienced more than once in the same year or possibly only a few times in a century. Many of these floodplains can be identified for protection through use of the Federal Emergency Management Agency's Flood Insurance Rate Maps (FIRMs) and Flood Insurance Study (FIS) maps. These maps often identify the 10-, 25-, and 50- year floodplains as well. The 100-Year Floodplain has not yet been mapped for all streams in the City.

Historically, floodplains have been protected to guard against injury to people and to prevent destruction of property. However, protection of floodplains brings other benefits too. Floodplains moderate and store floodwaters, absorb wave energies, and reduce erosion and sedimentation. Risks to adjoining and downstream communities are also minimized. They also contribute to the improvement of water quality and quantity, which may have a positive effect on drinking water supplies. Any type of development or filling in floodplains may cause the natural level of floodwaters to rise, impacting additional local areas as well as areas downstream. Interference with the natural fringe of the floodplain also results in the destruction of habitat for hydrophytic vegetation.

As a result, it is appropriate to protect floodplains by not permitting new buildings or site improvements, such as parking lots, to be located in the floodplain. In planning for new development on land that is impacted by the 100-year floodplain, the layout and size of new lots

needs to assure that sufficient area on the parcel is available for development outside of the floodplain. The lot itself may be platted within the floodplain, provided that the floodplain area would remain unimproved. Furthermore, it would be inappropriate to enlarge existing structures or site improvements located within floodplains. Any existing buildings or structures that are currently located within the floodplain should be relocated outside of the floodplain when feasible.

Habitat of Threatened and Endangered Species

In Maryland, over 200 plant and animal species have been extirpated over the past 350 years. Habitat destruction and degradation threatens to extirpate at least another 413 native Maryland species. The key to protecting threatened and endangered species is protecting the habitat in which they occur. Westminster currently has no identified threatened or endangered species, as identified by the Maryland Department of Natural Resources, Heritage and Biodiversity Conservation Programs. In the event that threatened or endangered species or related habitat areas are identified in the future, the City will need to prepare a plan for protection and mitigation for such species and habitat areas.

There are many reasons for protecting this habitat. We now know that plant chemicals have major pharmaceutical uses. Agriculture depends on the development of new varieties of crops that fend off pests and diseases. In addition, it is the responsibility of the present generation to preserve species for the benefit of future generations. Every plant and animal species plays a special role in the effective and efficient function of the biota in which it lives, as well as the ecosystem as a whole. Loss of one species will result in loss of additional species that depend on each other for survival, and upset the balance of the food chain. This imbalance may also cause proliferation of less desirable species.

Steep Slopes

Westminster's rolling terrain presents occurrences of steep slopes. These slopes contribute to the beauty that makes Westminster and surrounding Carroll County especially scenic. However, steep slopes also present a challenge to developers in designing buildings and subdivisions, as well as in protecting the immediate and adjacent areas during construction.

Slopes provide a medium for the movement of soil and pollutants when land disturbance occurs. Therefore, there are multiple reasons for protecting steep slopes. Preservation of slopes adjacent to waterways is especially important due to the potential impact on water quality and aquatic habitat.

The City development regulations require topographic and soils information to be shown on plans submitted for development approval. The location of steep slopes and erodible soils is considered during the development plan review and approval process conducted by staff and the Westminster Planning and Zoning Commission. Development on slopes in excess of 25 percent, or 15 percent with highly erodible soils, should be avoided unless it can be demonstrated that the stability of the slope will be improved or that adverse impacts will be mitigated.

Table 2.1. Current and Historical Rare, Threatened, and Endangered Species of Carroll County, Maryland

Scientific Name	Common Name	Maryland Status	Candidates for Federal Listing
Animals			
<i>Alasmodonta undulata</i>	Triangle floater	Endangered	
<i>Alasmodonta varicose</i>	Brook Floater	Endangered	•
<i>Ammodramus henslowii</i>	Henslow's sparrow	Threatened	•
<i>Clemmys muhlenbergii</i>	Bog turtle	Threatened	•
<i>Lanius ludovicianus</i>	Loggerhead shrike	Endangered	•
<i>Regulus satrapa</i>	Golden-crowned kinglet	Rare	
<i>Speyeria idalia</i>	Regal fritillary	Endangered	•
<i>Strophitus undulatus</i>	Squawfoot	Rare	
<i>Thryomanes bewickii</i>	Bewick's wren	Endangered	•
Plants			
<i>Asclepias rubra</i>	Red milkweed	Endangered	
<i>Carex buxbaumii</i>	Buxbaum's sedge	Threatened	
<i>Carex conjuncta</i>	Soft fox sedge	Endangered/Extirpated	
<i>Carex conoidea</i>	Field sedge	Endangered	
<i>Carex lanuginosa</i>	Woolly sedge	Threatened	
<i>Carex meadii</i>	Mead's sedge	Rare	
<i>Castilleja coccinea</i>	Indian paintbrush	Endangered	
<i>Elatine minima</i>	Small waterwort	Endangered	
<i>Euphorbia purpurea</i>	Darlington's spurge	Endangered	•
<i>Fraxinus profunda</i>	Pumpkin ash	Rare	

Table 2-1 (cont.). Current and Historical Rare, Threatened, and Endangered Species of Carroll County, Maryland.

Scientific Name	Common Name	Maryland Status	Candidates for Federal Listing
<i>Geum aleppicum</i>	Yellow avens	Endangered	
<i>Galiuma trifidum</i>	Small bedstraw	Rare	
<i>Krigia dandelion</i>	Potato dandelion	Endangered	
<i>Lonicera canadensis</i>	Canada honeysuckle	Endangered	
<i>Lupinus perennis</i>	Wild lupine	Threatened	
<i>Lythrum alatum</i>	Winged loosestrife	Endangered	
<i>Platanthera peramoena</i>	Purple fringeless orchid	Threatened	
<i>Matteuccia struthiopteris</i>	Ostrich fern	Rare	
<i>Pycnanthemum verticillatum</i>	Whorled mountain-mint	Endangered	
<i>Ribes americanum</i>	Wild black currant	Endangered	
<i>Sanguisorba canadensis</i>	Canada burnet	Threatened	
<i>Scirpus smithii</i>	Smith's clubrush	Endangered/Extirpated	
<i>Scirpus verecundus</i>	Bashful bulrush	Rare	
<i>Scleria reticularis</i>	Reticulated nutrush	Rare	
<i>Sphenopholis pensylvanica</i>	Swamp-oats	Threatened	
<i>Talinum teretifolium</i>	Fameflower	Threatened	

Source: Maryland Department of Natural Resources, Wildlife and Heritage Division, July 5, 2001.

Clearing, grading, and the development of land results in increased stormwater runoff, which accelerates erosion and results in the runoff transporting more sediment to streams. Increased sediment in streams may create channel bars, contributing to erosion of stream banks, as well as making the channel wider and shallower. Increased runoff and sedimentation also results in decreased water quality. Nutrients in the soil sediments are carried downstream. Upslope soils are impoverished, while turbidity, sedimentation, and aggravated eutrophication is occurring in the receiving waterways. Sediment also contains heavy metals, pesticides, and other

pollutants. Aquatic vegetation is destroyed by scour, burial, and turbidity caused by increased sediments. The destruction of vegetation decreases photosynthetic activity, thereby reducing oxygen levels for aquatic life. Trout are also sensitive to impacts from sedimentation. Trout eggs suffocate from siltation, and the inhalation of silt particles results in gill membrane inflammation and then death. In addition to the increased potential for erosion, steep slopes that are altered contain less efficient organisms and less efficient vegetation.

Wetlands

Wetlands are often associated geographically and biologically with streams and floodplains. There are many non-tidal wetland areas found in the County, as well as in the corporate limits of Westminster. These wetlands and their function are threatened by the adverse impacts of development.

Wetlands serve an important function in maintaining quality and quantity of water supplies. In wetlands, inorganic nutrients are converted to organic materials and stored in the hydrophytic vegetation. Stems, leaves, and roots slow the flow of runoff entering the wetland area thereby allowing sediment to settle out and be deposited in the wetlands prior to the runoff reaching stream waters. Wetlands also have a positive impact on the quantity of water, functioning as natural stormwater management facilities. They absorb and retain water, slowly discharging it into the streams. Therefore, stream flows are maintained at a more consistent level during dry periods, as well as during periods of flooding. Water collected and stored in wetlands also filters down through the soil to recharge groundwater supplies. Wetland areas provide essential habitats to a wide variety of flora and fauna, including migrating waterfowl and certain hydrophytic plants found only in wetland areas.

Destruction of wetlands results in higher, faster, and dirtier runoff flows into streams when development occurs too close to a wetland. The wetland is unable to absorb the increased level of pollution coming from the development site. Stream eutrophication occurs at an accelerated rate when the wetland becomes overloaded with nutrients and pollutants, often resulting in a settling basin of polluted water with unpleasant odors. Since water is stored in wetlands, filling these areas not only causes stream flows to be higher than normal but may also cause water to collect in new areas. Wetlands also serve to reduce turbidity. Increased stream turbidity, defined as particles suspended in water, reduces the amount of sunlight reaching aquatic plants. Therefore, when the function of wetlands is impaired, or they are destroyed, aquatic plants in the stream are adversely impacted.

Wellhead Buffers

The availability of potable water is a major concern for the City of Westminster and throughout Carroll County. The quality of water supplies is dependent upon the land use activities that occur within the watershed and aquifer recharge areas. With the contamination of several wells in Taneytown, Westminster, and Hampstead in recent years, it became apparent that the areas around the municipal wellheads were in need of protection. The County is highly dependent on the abundant supply of groundwater found in many parts of the County. Municipal water supplies, serving a large percentage of the population, rely on and are drawn from these groundwater aquifers.

A wellhead protection area is the surface and subsurface area surrounding a water well or wellfield, supplying a public water system, through which contaminants are reasonably likely to move toward and reach such water well or wellfield. The wellhead provides direct access to the groundwater aquifer from which water is drawn, potentially conveying contaminants to the groundwater quicker and in higher concentrations and then withdrawing the water at the same site. Groundwater can become contaminated by many hazardous materials, such as pesticides, fertilizers, organic chemicals, and human wastes. The degree of contamination depends on soil characteristics, contaminant characteristics, groundwater flow, and other factors. Once contaminated, aquifers are difficult and expensive to clean up. Drilling new wells may not be feasible as many aquifers are large in size or interconnected, thereby spreading the contamination to a large area. Protection of wellheads is essential to maintaining water quality for human consumption and environmental health.

Carbonate Rock Areas

The carbonate rock areas of Carroll County include the Wakefield Marble and Silver Run Limestone geologic units, as well as calcareous zones found in schist, phyllite, and metavolcanic rock areas, as shown in the Phase II Report, *Carroll County Water Resources Study* (Volume 1, R.E. Wright Associates, Inc, May 1988). Carbonate rocks constitute the primary supply aquifers for the Towns of Union Bridge and New Windsor, as well as the Westminster Wakefield Valley satellite system. Carbonate rocks form the most productive and environmentally-sensitive aquifers in Carroll County. The carbonate minerals in this type of aquifer are readily soluble in groundwater, and joints and fractures may be greatly enlarged to form cavities. Carbonate rocks are frequently bounded by, and interbedded with, schist, phyllite, or metavolcanic rocks. Aquifer transmissivity and storativity in the carbonate rock aquifers is generally fairly high in this area. The variable transmissivity, the presence of plugged and open solution channels, frequent boundary conditions, and complex geologic structure make the hydrology of carbonate rocks extremely complex and frequently unpredictable. The carbonate rock aquifer is very susceptible to contamination, since the presence of voids in the subsurface does not allow adequate filtering of contaminants. In addition, the high transmissivity allows the rapid spread of contaminants throughout the highly conductive flow paths in these types of aquifers.

According to an R. E. Wright report, due to the solution-prone nature of the aquifer materials, sinkholes are a common feature of this terrain and provide a direct conduit into the groundwater system through which contaminants may travel. Sinkholes have and will occur

naturally, although studies have shown that the majority of sinkholes formed today are triggered as a result of human activities, such as groundwater withdrawals. Sinkhole development is exacerbated by water table fluctuations, concentrated infiltration, and/or vibration. Sinkhole development begins deep in the subsurface in solution channels and fractures in the carbonate aquifer. As these channels are enlarged by dissolution and the remaining insoluble materials are compacted or flushed out, small voids are created. This may begin a "stoping" effect in the soils in the dissolved areas above, as soil particles continuously move downward. Temporary soil bridges are formed in the solutioned areas between unweathered rock pinnacles, and collapse as the void area moves upward. Depending upon the rate of downward soil movement, this may be evident on the surface as a slow subsidence or sudden collapse.

Reservoir Watersheds

A watershed includes all areas from which water drains into a body of water--in this case, a reservoir. Wooded areas and other types of vegetation in these watersheds directly affect water quality and need to be protected as well.

A major source of water for the City of Westminster is the Cranberry Branch, a tributary to the West Branch of the Patapsco River. The City's raw reservoir is located north of Lucabaugh Mill Road, and a 30-inch transmission line runs along Cranberry Branch from the reservoir to the water treatment plant in Cranberry. In the same vicinity, the City also extracts surface water from Hull Creek, another tributary to the West Branch of the Patapsco. The City's surface water resources are adversely affected by upstream agricultural uses that increase nutrients in the stream due to stormwater runoff carrying fertilizers and other nutrients. Furthermore, runoff from the County's Lucabaugh Mill Road directly enters Hull Creek without any stormwater quality control.

In addition to the City's reservoir, Carroll County currently has two other existing reservoirs, which are Piney Run and Liberty reservoirs. The County has also identified two additional reservoir sites to accommodate the water supply needs of County residents in the future. These sites include Gillis Falls and Union Mills Reservoirs. Liberty Reservoir is a 3,106-acre water supply reservoir on the North Branch of the Patapsco River that serves the Baltimore Metropolitan area and Carroll County's Freedom Community Planning Area. Liberty Reservoir Watershed encompasses 11,393 acres in the County and is 8.25 miles long. Portions of eastern Carroll County also fall into the reservoir watershed of two reservoirs located in Baltimore County--Pretty Boy and Loch Raven Reservoirs.

Although the water has been identified as threatened by nutrient enrichment, water quality is otherwise generally good. Many of Carroll County's streams are components of these watersheds which directly affect the quality of the water supply.

Use III Waters

Carroll County has several waterways which have been identified as Use III waters. These streams, which are protected for the natural propagation of trout, include all or part of the following streams and all of their tributaries: Gunpowder Falls, Morgan Run, Beaver Run, Snowdens Run, Stillwater Creek, East Branch Patapsco River, Carroll Highlands Run, Autumn Run, Piney Run, Gillis Falls, Aspen Run, and South Branch Patapsco River (above the confluence with Gillis Falls). The first nine of these streams are further classified as III-P, which means that they flow into a public water supply. As a result, Use III-P streams are regulated even more strictly on toxics than other Use III waters. The remaining streams in the County are Use IV (Recreational Trout Waters) or Use I (Water Contact Recreation and Protection of Aquatic Life). Fishing is an important recreational use of these streams. The presence and health of fish can be an important indicator of water quality.

Goals and Objectives

To help guide and direct the purpose and activities discussed in the Environmental Resources Element of the Comprehensive Plan, goals and objectives were developed. The goals establish the overall issues to be addressed by the Plan. The objectives identify ways in which these goals will be accomplished. Recommended actions for each objective are provided in *Chapter Fourteen, Plan Implementation*.

Goal 1: Protect and maintain the environmental resources in the County and municipalities.

Objectives and recommended actions:

1. Maintain and enhance water quality in streams, groundwater, wetlands, and reservoirs.
 - a. Where no vegetation exists around streams, wellheads, wetlands, and reservoirs, require buffer plantings to protect water from development.
 - b. Disturbance to natural vegetation within stream buffers including tree removal, shrub removal, clearing, burning, or grubbing should be discouraged unless necessary for utilities or other public purposes.
 - c. Require new development to incorporate stormwater management facilities that reduce heavy runoff, minimize pollutants entering local streams, and are consistent with protection of the designated water use as defined in COMAR 26.08.02.
 - d. Analyze the nutrient loadings and quality of streams to determine the need for stream restoration.
 - e. Consider the adoption of a water resources management ordinance.
2. Maintain and enhance water quantity in groundwater aquifers and reservoirs.
 - a. Require wellhead buffers and reservoir buffers to protect water supplies from development.

- b. Continue monitoring of the public water supply, utilizing new technology as it becomes available.
 - c. Consider the adoption of a water resources management ordinance.
 - d. Encourage water conservation.
- 3. Preserve where possible and improve wildlife corridors, identified habitats of threatened and endangered species, and contiguous forested areas.
 - a. Preserve existing forested areas as much as practical.
 - b. When existing forest must be removed, require reforestation or afforestation that will most benefit natural habitats.
 - c. Require submission of a written Environmental Assessment for any development proposal within or adjacent to identified threatened or endangered species habitat.
 - d. Coordinate the protection of any identified threatened and endangered species habitat with the Maryland Wildlife and Heritage Service of the Department of Natural Resources.
- 4. Identify the location of environmental resource areas in order to improve their protection.
 - a. Use Maryland's Technology Toolbox as a source for environmental resource mapping.
 - b. Inventory and map environmental resources that are not included in the Technology Toolbox.
 - c. Coordinate with County staff to utilize existing mapping to reduce cost and provide more accurate information to each jurisdiction.

Goal 2: Reduce the adverse effects of development on environmental resources.

Objectives:

- 1. Adopt and implement creative, flexible, and streamlined development regulations that are sensitive to the natural environment.

- a. Identify locations where a Planned Development and its associated open space could be used to protect environmental resources.
 - b. Streamline the rezoning process for Planned Developments.
 - c. Review the Planned Development Zoning to determine whether there is sufficient flexibility in the area and setback requirements for the zoning district.
2. Integrate best management practices and appropriate mitigation measures where sensitive environmental areas cannot be avoided during the land planning and development process.
 - a. Revise Subdivision and Site Plan Regulations as appropriate to achieve this objective.
 - b. Encourage the use of innovative mitigation measures when sensitive environmental areas cannot be avoided.
 - c. Review the manual for construction of roads to consider if changes should be made to better protect environmental resources.
3. Protect streams and their buffers, minimize flood hazards, provide open space, and provide protection for other environmental resource areas through creative site design.
 - a. Develop design guidelines that will achieve this objective.
 - b. Complete the actions that address the protection of water resources and encourage the use of the City's Planned Development Zone.
4. Adopt and implement innovative environmental resource design guidelines.
 - a. Research existing environmental resource design guidelines used by other communities before developing draft guidelines.
 - b. Consider the environmental resources that are located in the Community Planning Area on sites with annexation potential so that protection measures are considered during review of any annexation petitions.

- c. Prohibit new development on steep slopes (greater than 25 percent) unless it can be demonstrated that the stability of the slope will not be adversely affected and that adverse environmental impacts will be mitigated.
 - d. Prohibit new development on slopes greater than 15 percent if highly erodible soils are also present, unless it can be demonstrated that the stability of the slope will not be adversely affected and that adverse environmental impacts will be mitigated.
- 5. Assure the quality and quantity of community groundwater supplies through wellhead protection measures.
 - a. Complete the actions that address the protection of water resources.
 - b. Extend protection measures to planned wellheads.
- 6. Coordinate with the County to limit development near surface municipal water supplies.
 - a. Provide incentives to property owners with developable land near surface municipal water supplies to ensure development does not occur within an acceptable area.
 - b. Discuss the rezoning of key parcels near surface municipal water supplies with appropriate agencies to ensure the supply is not compromised by development.

Goal 3: Coordinate efforts between the County and municipalities to protect environmental resources.

Objectives:

- 1. Develop and implement a coordinated natural resource protection strategy.
 - a. Participate in initiatives that would achieve this objective.
 - b. Coordinate with the County when considering the adoption of environmental resource regulations or guidelines.

2. Standardize protective measures between the jurisdictions to ensure uniform protection.
 - a. Participate in initiatives that would achieve this objective.
 - b. Coordinate with the County when considering the adoption of environmental resource regulations or guidelines.
3. Develop a uniform regulatory and streamlined review process.
 - a. Participate in initiatives that would achieve this objective.
 - b. Coordinate with the County when considering the adoption of environmental resource regulations or guidelines.